April 29, 1930. A. E. REID 1,756,761

PISTON AND CONNECTING ROD

Filed Feb. 26, 1929

Fig. 1

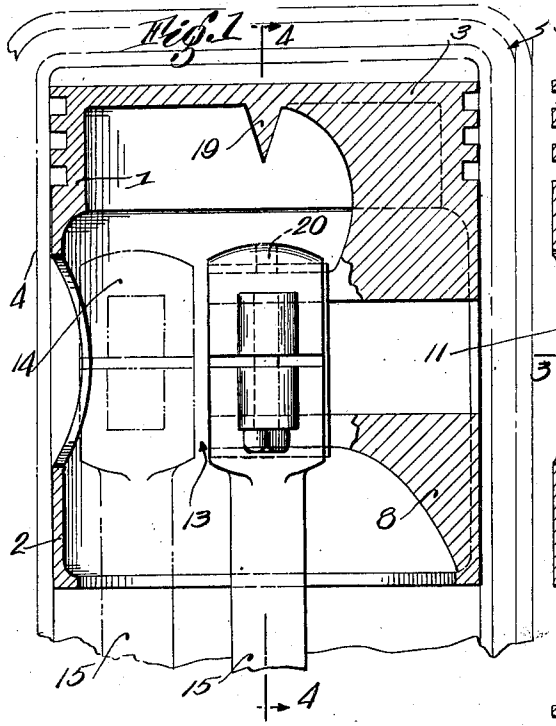


Fig. 2

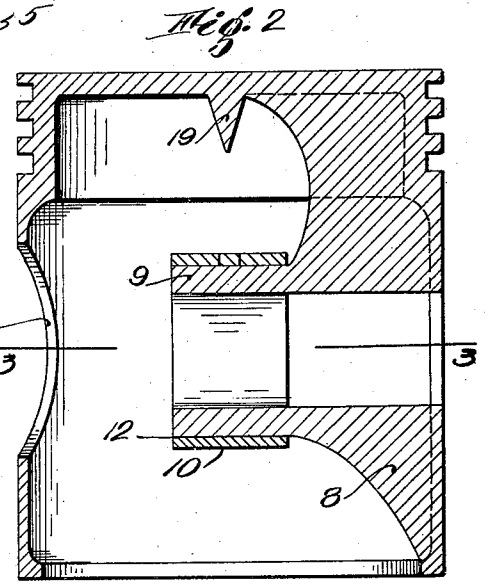


Fig. 3

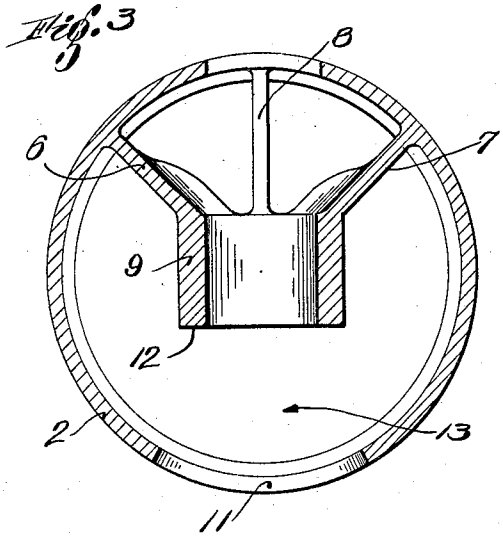
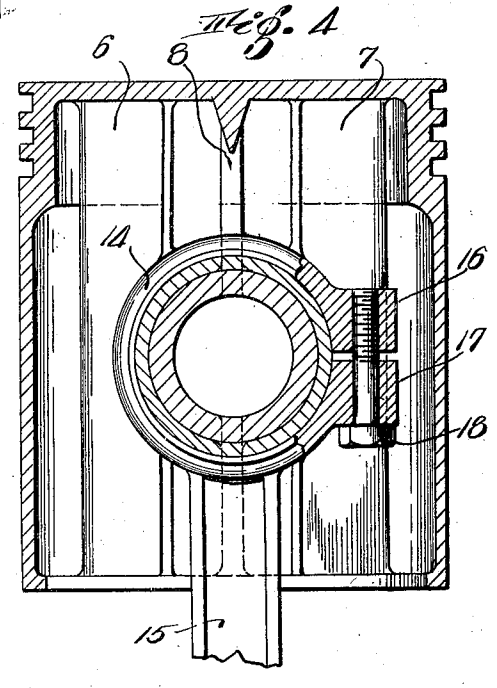


Fig. 4



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UNITED STATES PATENT OFFICE

ALLAN E. REID, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO REID PISTON COMPANY, OF BROOKLINE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

PISTON AND CONNECTING ROD

Application filed February 26, 1929. Serial No. 342,917.

This invention pertains to connecting rods and pistons of the type commonly employed in internal combustion engines, air compressors and the like, and relates more particularly to improved means for uniting a piston and connecting rod. In my co-pending application Serial No. 327,006 filed December 19, 1928, I have described some of the practical difficulties arising from the use of the usual wrist pin for uniting the piston and rod, and have broadly disclosed means illustrative of a novel genus of connecting means of which the present invention is a specific embodiment. In the aforesaid application I described and broadly claimed an arrangement in which the usual separate wrist pin is eliminated with consequent improved function and increased facility in assembly and separation of the parts, together with certain specific illustrations thereof, wherein a pivot member permanently united to the connecting rod turns in a bearing disposed inside of the piston.

In accordance with the present invention I affix the pivot member to the piston, as for example making it an integral projection upon the inner surface of the piston, and with this piston I employ a connecting rod which does not differ, except optionally as to the diameter of its journal opening, from connecting rods of usual type. This arrangement possesses the desirable characteristics inherent in the generic construction, as more fully set forth in my aforesaid application, and as compared with the specific disclosure of said application possesses certain further advantages, as for example the permissive use of a connecting rod of substantially usual type, as already mentioned,—simplification of parts, and greater ease in manufacture.

In the accompanying drawings, one desirable embodiment of the invention is illustrated by way of example, and in the drawings,

Fig. 1 is a vertical section, partly in elevation, showing the piston and a part of its associated connecting rod and indicating the engine cylinder in broken lines;

Fig. 2 is a view similar to Fig. 1 but omitting the connecting rod and cylinder;

Fig. 3 is a transverse section substantially on the line 3—3 of Fig. 2; and

Fig. 4 is a vertical section on the line 4—4 of Fig. 1, omitting the cylinder.

Referring to the drawings, the invention is illustrated as embodied in a trunk piston 1 having the usual skirt portion 2 and head 3, such pistons being commonly employed in internal combustion engines. In Fig. 1, the piston is illustrated as disposed within a cylinder 4 having a head 5.

Within the piston I provide suitable supporting means, for example the webs 6, 7 and 8, (Fig. 3) projecting integrally from the inner surface of the piston wall and merging into the cylindrical part 9, which is preferably hollow or of annular form, and of suitable diameter, preferably substantially larger than the usual wrist pin, to constitute the desired pivot member. Since it is common to make pistons of relatively soft material, such for example as cast iron or aluminum, it may be desirable to furnish this pivot member 9 with a sleeve or bushing 10 of wear-resistant material, for example bronze having a finished peripheral surface. The supporting webs 6, 7 and 8 engage the cylindrical pivot member 9 at one end and support it with its axis transverse to the axis of the piston and preferably, though not necessarily, at a point such that it is substantially symmetrical with the axis of the piston. That is to say, the ends of this cylindrical member 9 are preferably at substantially equal distances from the axis of the piston.

Preferably the piston wall is furnished with an opening 11 through which suitable tools may be introduced for machining and finishing the pivot member 9 with its bushing 10. The free or unsupported end 12 of the pivot member is spaced from the inner surface of the piston body, as shown at 13, sufficiently to permit the head 14 of a connecting rod 15 to be introduced between the end 12 of the pivot member and the inner surface of the piston body, as indicated in broken lines in Fig. 1.

Thus, in assembling the parts, the end of the connecting rod is advanced into the piston until the journal opening in the connect-

ing rod is axially aligned with the pivot member 9. The connecting rod is then moved bodily to the right, as viewed in Fig. 1, until it telescopes over the pivot member, thus permitting assemblage of the parts or separation of the same without removing the piston from the cylinder. After being assembled in this manner, the other end of the connecting rod is attached to the crank on the crank shaft of the engine and is thereby kept in operative engagement with the pivot member 9.

Preferably the head 14 of the connecting rod is split and provided with outstanding bosses 16 and 17 at opposite sides of the gap, such bosses receiving an adjusting bolt or screw 18, whereby the effective diameter of the journal opening in the connecting rod may be varied to take up wear. Since the head of the bolt 18 is exposed at the open end of the piston, wear may be taken up without removing the piston from the cylinder.

If desired, the head of the piston may be provided with an internal boss 19 of tapering form adapted to collect oil and to direct it to an oil receiving opening or openings 20 in the head 14 of the connecting rod.

While I have shown integral webs 6, 7 and 8 for supporting the pivot member, I contemplate that other means may be used for retaining this part in operative position, and while the pivot member has here been shown as disposed symmetrically with respect to the axis of the piston, this is not wholly necessary, and its position may be varied in accordance with circumstances, provided, however, that its free end is always spaced from the piston wall sufficiently to admit the head of the connecting rod between them.

I claim:

1. The combination of a piston with a connecting rod, the connecting rod having a journal opening whose axis is transverse to that of the piston, and a pivot member permanently united to the piston and adapted to fit within the opening in the connecting rod.

2. The combination of a hollow piston with a connecting rod, the connecting rod having a journal opening and the piston having an internal pivot member permanently united to it, said connecting rod being capable of assembly with the piston by movement of the connecting rod relatively to the piston such as to cause the journal opening in the rod to slip axially over the pivot member.

3. The combination of a piston and connecting rod useful in an internal combustion engine having a cylinder, said piston having a pivot member permanently attached at one end to the piston body and free at its other end, the free end of the pivot member being spaced from adjacent parts to permit assembly of the connecting rod with the pivot member without withdrawing the piston from the cylinder.

4. The combination with a trunk piston having a member projecting integrally from its inner surface, said member having a finished cylindrical portion constituting a pivot, with a connecting rod having a journal opening for the reception of said pivot.

5. A trunk piston having an internal pivot member disposed with its axis transverse to that of the piston, and means permanently connecting said pivot member to the piston body, said pivot member being free at one end at least to permit assemblage of a connecting rod therewith without disturbing the connection between the pivot member and the piston body.

6. A trunk piston having an internal pivot member disposed with its axis transverse to that of the piston, and means permanently connecting said pivot member to the piston body, said pivot member being arranged symmetrically with respect to the axis of the piston and being spaced at one end at least from the piston wall to permit assemblage of a connecting rod therewith.

7. A trunk piston having an internal pivot member of annular form disposed symmetrically with respect to the axis of the piston and with the axis of the pivot member transverse to that of the piston, and means engaging one end of the pivot member for permanently attaching it to the piston body, the other end of the pivot member being spaced from the inner surface of the piston.

8. A trunk piston having a plurality of webs projecting from its inner surface and a substantially cylindrical bearing member united at one end to said webs and supported thereby, the other end of the pivot member being free and extending beyond the webs for operative engagement with a connecting rod.

9. A trunk piston having an internal pivot member of substantially cylindrical form, and means uniting one end of said pivot member to the piston body, the other end of the pivot member being free, said pivot member comprising a bushing of wear resistant material adapted to enter within a journal opening in a connecting rod whereby to form an articulated joint between the piston and rod.

Signed by me at Boston, Massachusetts, this 23rd day of February, 1929.

ALLAN E. REID.